

FORM PCT 1390
REV. 5/93

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NO
PARTZSCH ET AL.-2 (PCT)TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/831965

INTERNATIONAL APPLICATION NO.
PCT/DE00/03203INTERNATIONAL FILING DATE
14 SEPTEMBER 2000PRIORITY DATE CLAIMED
17 SEPTEMBER 1999

TITLE OF INVENTION

CORONA SHIELDING ARRANGEMENT AND METHOD FOR THE PRODUCTION THEREOF

APPLICANT(S) FOR DO/EO/US

THOMAS PARTZSCH ET AL.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371 (f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau)
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has **NOT** expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

Applicants Claim Priority under 35 U.S.C. §119 of German Application No. 199 44 664.4 filed September 17, 1999.

Applicant Claims Priority under 35 U.S.C. §120 of: PCT/DE00/03203 filed September 14, 2000.

APPLICATION NO. (if known, see 37 CFR 1.5)

09/831965

INTERNATIONAL APPLICATION NO
PCT/DE00/03203ATTORNEY'S DOCKET NO
PARTZSCH ET AL.-2☒ The following fees are submitted:**Basic National Fee (37 CFR 1.492(a)(1)-(5)):**

Search Report has been prepared by the EPO or JPO.....\$860.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)

.....\$690.00

Neither international preliminary examination fee paid (37 CFR 1.82) nor

international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....\$1,000.00

International preliminary examination fee paid to USPTO (37 CFR 1.482)

and all claims satisfied provisions of PCT Article 33(2)-(4).....\$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$ 860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ____ 20 ____ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

Claims	Number Filed	Number Extra	Rate		
Total Claims	3 - 20 =	- 0 -	X \$18.00	\$	
Independent Claims	1 - 3 =	- 0 -	X \$80.00	\$	
Multiple dependent claim(s) (if applicable)			+ \$270.00	\$	
TOTAL OF ABOVE CALCULATIONS =				\$ 860.00	
Reduction by 1/2 for Small Entity status.				\$ 430.00	
SUBTOTAL =				\$ 430.00	
Processing fee of \$130.00 for furnishing the English translation later than ____ 20 ____ 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$ 430.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +					
TOTAL FEES ENCLOSED =				\$ 430.00	
				Amount to be: refunded	\$
				charged	\$

☒ Applicant claims Small Entity status.a. ☒ A check in the amount of \$ 430.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. 03-2468 in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to Deposit Account No. 03-2468. A duplicate copy of this sheet is enclosed.**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**SEND ALL CORRESPONDENCE TO:
COLLARD & ROE, P.C.
1077 Northern Boulevard
Roslyn, New York 11576-1696
(516) 365-9802

Signature

Edward R. Freedman
Reg. No. 26,048Express Mail No. EL 769 391 441 US
Date of Deposit May 16, 2001

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10, on the date indicated above, and is addressed to the Ass't. Commissioner for Patents, Washington, D.C. 20231

Lisa L. Vulpis

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS: THOMAS PARTZSCH ET AL. - 2 (PCT)
PCT NO.: PCT/DE00/03203
FILED: SEPTEMBER 14, 2000
TITLE: CORONA SHIELDING ARRANGEMENT AND METHOD FOR THE
PRODUCTION THEREOF

PRELIMINARY AMENDMENT

BOX PCT
Ass't. Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Preliminary to the initial Office Action, please amend the
above-identified application as follows:

IN THE SPECIFICATION:

On Page 1, after the title and before line 1, please insert
the following paragraphs:

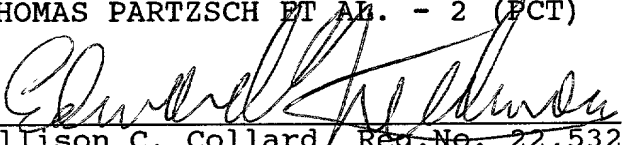
--CROSS REFERENCE TO RELATED APPLICATIONS

Applicants claim priority under 35 U.S.C. §119 of German
Application No. 199 44 664.4 filed September 17, 1999. Applicant
also claims priority under 35 U.S.C. §120 of PCT/DE00/03203 filed
September 14, 2000. The international application under PCT
article 21(2) was not published in English.--

REMARKS

By this Preliminary Amendment, the application has been amended to conform with U.S. practice, the cross-reference to related applications has been inserted on page 1. No new matter has been introduced. Entry of this amendment is respectfully requested.

Respectfully submitted,
THOMAS PARTZSCH ET AL. - 2 (PCT)


Allison C. Collard, Reg. No. 22,532
Edward R. Freedman, Reg. No. 26,048
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Express Mail No. EL 769 391 441 US
Date of Deposit May 16, 2001

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Lisa L. Vulpis

Corona shielding arrangement and techniques to fabricate it

This invention relates to a corona shielding arrangement for the stator winding of rotating high-voltage machines with round-wire winding combined with a slot portion insulation
5 consisting of a slot liner with a conducting slot-portion corona shielding, a semi-conducting overhang corona shielding, and a technique to fabricate the corona shielding arrangement.

Overhang corona shielding arrangements in high-voltage machines with former windings made of rectangular wire and sleeve insulation with semi-conducting corona shielding
10 varnish or semi-conducting corona shielding tape to improve the voltage distribution at the slot end are known in a large variety of designs.

DE 30 45 462 describes a solution wherein a shielding base material, consisting of semi-conducting material, is wound onto the ground insulation as overhang corona shielding and
15 subsequently impregnated.

DE 42 18 928 comprises an overhang corona shielding arrangement wherein a semi-conducting corona shielding tape is applied on top of the ground insulation with the overlapping decreasing towards the end of the bar.
20

In DE 196 34 578 an overhang corona shielding arrangement is described wherein the voltage distribution is improved by using grading rings (equipotential rings) on the insulation in the area of the slot end.

25 The above referenced arrangements or techniques have several disadvantages:

In order to obtain the specified overlapping and to satisfy the technological specifications, the semi-conducting corona shielding tape must be applied very carefully by wrapping.

Folds or gaps in the wrapping are inadmissible. However, it is difficult to meet this requirement, particularly when a tape of greater length is applied. Additional impregnation

5 to obtain the desired overhang corona shielding effect requires extra technological work.

This is also true of the proposed grading arrangements.

The known coatings with semi-conducting corona shielding varnishes which are provided to

obtain the desired overhang corona shielding cannot be applied at all in the case of a slot

10 portion insulation which consists of panel-type insulating material because they must be applied by spreading or spraying prior to impregnating them with liquid insulating medium at the slot end, and in doing so they penetrate into the ground insulation in the overlapping zone of the panel-type insulating material, usually in the area of the slot opening, where they unacceptably shorten the creepage path between winding wire and laminated core.

15

When using semi-conducting corona shielding tapes to provide the overhang corona shielding, any contacting of the tapes with the conductive corona shielding of the slot portion is problematic because at high voltages poor contacting results in partial discharges, which again, further worsens the contact making so that finally the overhang corona

20 shielding becomes ineffective. In all common arrangements used to date, the point of contact is located outside the laminated stator core.

It is an object of this invention to provide a corona shielding arrangement and a technique to fabricate it relating to the stator winding of rotating high-voltage machines with round-wire

25 winding and slot lining, thus providing an overhang corona shielding which safely controls

FORBIDDEN TO REPRODUCE

all electric stresses occurring at the slot end, primarily during power-frequency and impulse voltage testing as well as during switching operations during service, and which provides good contact making between slot portion and overhang corona shielding thus causing higher partial-discharge inception voltages, and which reduces material consumption and
5 time required for fabricating the overhang corona shielding of the high-voltage winding.

In accordance with the present invention, the object is achieved by the characteristic features of Claim 1 and Claim 2. According to this invention the corona shielding arrangement for the stator winding of rotating high-voltage machines with round-wire winding, slot lining
10 and corona shielding material is fabricated so that the slot lining on the side facing the laminated core consists of conducting and semi-conducting corona shielding materials arranged both outside the laminated stator core and inside the laminated stator core with the semi-conducting material used for the overhang corona shielding consisting of monoplane semi-conducting corona shielding material, cut into strips, and arranged on either side at slot
15 level and, if required, also on the bottom of the slot on the slot lining. The point of contact between conducting and semi-conducting corona shielding materials is located within the laminated stator core. Optionally, the slot lining may consist of one or several layers.

According to the suggested technique the semi-conducting corona shielding materials to be
20 arranged at the conducting corona-shielding material are glued on only partially. The semi-conducting corona shielding materials may also be inserted in the slot ends during or after arrangement of the slot lining. Subsequently the winding is drop-fed into the slots through the slot opening and the slot closed by folding the slot lining and inserting the slot closing strip. Then the end winding is wrapped whereby the slot lining protruding from the slot is
25 also insulated up to the laminated stator core. In doing so the semi-conducting corona

shielding material must be kept away from the slot lining. Upon completion of this operation, the semi-conducting corona shielding material is applied to the end winding insulation and fastened with adhesive tape or cover tape which is placed on the end winding insulation.

5

In a preferred arrangement the conducting corona shielding material is glued onto the slot lining covering the surface either partially and/or fully. Preferably, the conducting corona shielding material may be of the same length as the laminated stator core.

- 10 According to this invention, an overhang corona shielding does not require complete wrapping of the round-wire windings in the zone of the end winding with overhang corona shielding tape. Favourable voltage distribution is obtained throughout the entire insulation in the area of the slot end. Partial discharges are reliably limited and it is now possible to satisfy the typical testing conditions for high-voltage machines without causing any damage
- 15 to the winding insulation. Due to the strip-type design of the overhang corona shielding, fabricated according to the present invention, the invention guarantees effective potential grading for round-wire windings with slot lining.

- In the following the invention will be explained in greater detail in a preferred embodiment
- 20 describing a corona shielding arrangement for the stator winding of rotating high-voltage machines wherein the stator winding which is executed as a blank round-wire winding is inserted in slots of a laminated stator core with straight slot bottom. According to the present invention, strips of semi-conducting corona shielding material are arranged on the two sides of the slot and on the slot bottom. These three strips consisting of semi-conducting corona
- 25 shielding material are arranged on top of the conducting corona shielding material of the slot

so that they are contacting each other within the laminated stator core. The said conducting corona shielding material is arranged on the slot lining. It may either be inserted only or alternatively glued to the said slot lining. Subsequently, the slot lining is inserted in the stator slot together with the corona shielding fabricated according to this invention,.

- 5 Depending on electrical stresses to be expected, the slot lining may consist of one or several layers.

Next the winding is fed-in and the slot closed. Now the three strips of the semi-conducting corona shielding material must be kept away from the slot lining. Then the end winding is wrapped with insulating tapes wherein the slot lining protruding from the slot is being insulated up to the laminated stator core. Following this operation, the three strips of the said semi-conducting corona shielding material are placed onto the insulation of the end winding and fastened with adhesive tape or cover tape which is wrapped on top of said end winding insulation.

15

When the slot bottom is rounded, only two strips of the semi-conducting corona shielding material are arranged on top of the conducting corona shielding material of the slot. The width of said semi-conducting corona shielding material shall be preferably equivalent to the height of the straight slot slope. Here again, the material should preferably be glued onto the conducting corona shielding material only in some points to ensure contacting.

20

Subsequently, as is known, the stator winding is impregnated with resin using a common impregnating procedure.

25

Claims:

1. Corona shielding arrangement for the stator winding of rotating high-voltage machines with round-wire winding, slot portion insulation and both conducting and semi-conducting
- 5 corona shielding material, characterized in that
- the slot portion insulation is provided with conducting and semi-conducting corona shielding materials both outside and inside the laminated stator core, wherein the point of contact between the conducting and the semi-conducting corona shielding material is located within the stator core and
- 10 the corona shielding material is applied to a slot lining which consists of one or several layers.
2. Technique to fabricate a corona shielding arrangement according to claim 1, characterized in that
- 15 – the semi-conducting corona shielding materials to be applied on the conducting corona shielding material inside the laminated stator core for voltage grading are either glued on the slot liner only partially before installing the liner in the slot or are inserted into the slot ends together with the conducting corona shielding material after installing the slot liner,
- 20 – the winding is drop-fed,
- in this process, the semi-conducting corona shielding material is kept away from the slot liner
- the end winding is insulated up to the stator core, including the slot liner, which protrudes from the slot;

- the semi-conducting corona shielding material is applied to the end winding insulation after the end winding has been insulated, and in that
- the corona shielding material is fastened either by means of an adhesive fleece or by means of the cover tape.

5

3. Corona shielding arrangement for the stator winding of rotating high-voltage machines according to claim 1,
characterized in that

- 10 – the conducting corona shielding material has preferably exactly the length of the
laminated stator core.

Summary

Corona shielding arrangement and techniques to fabricate it

The invention relates to a corona shielding arrangement for the stator winding of rotating high-voltage machines with round-wire winding combined with a slot portion insulation and a technique to fabricate the corona shielding arrangement. It is an object of this invention to provide an overhang corona shielding and a technique for its fabrication relating to a stator winding which safely controls the electric stresses occurring at the slot end, primarily during power-frequency and impulse voltage testing as well as during switching operations during service. It is a further object of this invention to improve the contact between slot portion and overhang corona shielding and to allow higher partial-discharge inception voltages. According to the present invention the corona shielding arrangement for the stator winding is designed so that conducting and semi-conducting corona shielding materials are arranged both outside the laminated stator core and inside the laminated stator core wherein the semi-conducting material used for the overhang corona shielding consists of monoplane semi-conducting corona shielding material, cut into strips, and arranged on either side at slot level and, if required, also on the bottom of the slot on top of the slot lining. The point of contact between conducting and semi-conducting corona shielding material is located within the laminated stator core. According to the present technique the semi-conducting corona shielding materials to be arranged on the conducting corona-shielding material are glued on only partially. Subsequently the winding is drop-fed into the slots through the slot opening. Then the end winding is wrapped wherein the slot lining protruding from the slot is also insulated up to the laminated stator core. In doing so the semi-conducting corona shielding material must be kept away from the slot lining. Upon completion of this operation, the semi-conducting corona shielding material is applied to the end winding insulation and fastened with adhesive tape or cover tape which is applied on top of the end winding insulation.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(includes Reference to PCT International Applications)ATTORNEY'S DOCKET NUMBER
PARTZSCH ET AL-2 PCT

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

CORONA SHIELDING ARRANGEMENT AND TECHNIQUES TO FABRICATE IT

the specification of which (check only one item below):

☐ is attached hereto.☐ was filed as United States application

Serial No. _____

on _____

and was amended

on _____ (if applicable).

☒ was filed as PCT international applicationNumber PCT/DE00/03203on September 14, 2000

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
GERMANY	199 44 664.4	17 SEPTEMBER 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

FOR PCT "SUBMITTED"

MAY-10-2001 17:11

COLLARD & ROE

516 365 9805 P.03/04

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY
(Includes Reference to PCT International Applications)ATTORNEY'S DOCKET NUMBER
PARTZSCH ET AL-2 PCT

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS			STATUS (Check One)		
U.S. APPLICATION NUMBER	U.S. FILING DATE		PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration numbers):

ALLISON C. COLLARD, Registration No. 22,532; KURT KELMAN, Registration No. 18,628
 EDWARD R. FREEDMAN, Registration No. 26,048; FREDERICK J. DORCHAK, Registration No. 29,298
 ELIZABETH COLLARD RICHTER, Registration No. 35,103; WILLIAM C. COLLARD, Registration No. 38,411
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Roslyn, New York 11576

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2	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
0	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
1	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
2	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
0	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
2	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
2	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
0	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
3	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE	DATE	DATE